

# HIGHBUSH BLUEBERRY CULTURE IN EASTERN CANADA


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# Highbush Blueberry Culture

## IN EASTERN CANADA

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Fruit of the highbush blueberry is becoming increasingly popular. It was unknown as a commercial crop at the turn of the century, but annual production in North America now exceeds 36 million kg. Fresh blueberries for dessert and blueberry pies are favorites. Each year, however, new uses are found for this delectable fruit. Recently blueberry syrup, blueberry tarts, and freeze-dry berries for cereal have come onto the market. Because blueberries freeze well, more than half the crop is processed by quick freezing.

Commercial culture of the highbush blueberry is a specialized field. The cultural techniques are similar to those used in tree-fruit production. Plantings are slow to bear fruit, but once established, they can produce crops throughout the lifetime of the owner. Success, however, demands attention to all the main cultural requirements.

## **Range**

The highbush blueberry is at the limit of its northern range in Eastern Canada. In many parts of this region low winter temperatures preclude commercial production, because the plants are severely injured or killed by temperatures of  $-29$  to  $-32^{\circ}\text{C}$ .

The berries are produced on the previous year's growth. Adequate shoot growth and flower formation occur when days are long and warm, and when soil and cultural treatments are such that plant growth is always vigorous. A long growing season is needed to allow the new wood enough time to attain the proper maturity to survive the winter. The climate in western Nova Scotia is adequate for the highbush blueberry, but most areas in the eastern and northern parts of the province are unsuited. Provided the soil is right and temperatures are similar to those of western Nova Scotia, the plant can grow in other localities of Eastern Canada, such as southern Ontario.

## **Choosing the site**

The type of soil on which highbush blueberries are planted is very important. It must be acid, with a pH of 4.3–4.8. Plants growing on soils that are less acid than 4.8 tend to be chlorotic. This condition is difficult to correct and such soils must be avoided.

Loose-textured soil such as sand and peat or mixtures of sand and peat are best. Heavier soils may be used, but they must be high in organic matter. Alternate freezing and thawing of heavy soils low in organic matter invariably heaves the plants during the winter and early spring and damages the roots. Planting in this type of soil has been one of the most common reasons for failure of this crop in Eastern Canada.





FIGURE 1. Highbush blueberry variety Bluecrop. The berries are 1–2 cm across.

## **Providing for moisture**

The highbush blueberry grows best where the water table in the soil can be maintained at 30–55 cm below the surface. Good drainage is important because the very fine root system needs adequate aeration. Water covering the soil surface for more than a day or two during any part of the growing season is harmful to the roots. The roots must also not become dried out. A soil high in organic matter retains water readily enough to prevent dehydration.

## **Preparing the soil**

Because the highbush blueberry is a perennial plant, the soil must be prepared carefully before planting. If necessary, lay a system of tiles and dig ditches to improve the drainage. If drainage is poor, do not plant highbush blueberries on the land.

The degree of success with this crop is closely related to the level of organic matter in the soil — the higher the better. In soils of low organic matter even a shovelful or two of moist peat moss at planting time can be beneficial. The amount is governed only by the cost of the organic matter used. This organic matter is vital not only for its moisture-holding capacity but also because it helps provide essential nutrients for the plant.

## Planting

Plant in the spring as soon as the soil is dry enough to be worked without packing. Fall planting is not recommended in Eastern Canada because of the danger of heaving by frost.

Highbush blueberry roots are extremely fine and they dry out quickly when exposed. At planting time, keep the roots covered with moist material such as peat moss.

Remove the fruit buds at planting time so that all the plant's resources are directed into vegetative growth. The fruit buds are easy to distinguish because they are much larger than the leaf buds. If in doubt, wait until the plants start to grow and remove the flowers as soon as they open.

TABLE 1. Number of highbush blueberry plants needed with various spacings

Metres between rows	Metres between plants	Number of plants per hectare
2.4	1.2	3362
2.4	1.5	2690
3.0	1.2	2690
3.0	1.5	2151

For commercial plantings space the plants 1.2–1.5 m apart in the row and leave 2.4–3.0 m between rows.

In home gardens plant bushes at least 1.5 m apart in each direction. Use two-year-old stock if possible. Three-year-old plants are also suitable but they cost more.

## Fertilizing

The highbush blueberry is adversely affected by high concentrations of soluble salts in the soil. Because nitrogen-containing fertilizer is a primary source of these salts and the growing season is short, fertilization must be carefully controlled. During the early years of plant growth, removal of all weeds and grasses, proper cultivation, and judicious use of water are more important than fertilization.

The highbush blueberry grows best at a pH of 4.3–4.8, which is more acid than that preferred by most plants. A naturally fertile soil, well-supplied with organic matter and well-tilled, is also a prime requirement for newly set plants.

If you provide these conditions, fertilizing is not necessary in the first few years. However, when additional fertility is needed, the proper nutrients can be supplied by lightly applying 10-10-10-2 fertilizer just before the buds open. Broadcast the fertilizer from within 15–25 cm of the plant to as far out as the roots extend. Table 2 gives

rates of application of fertilizer recommended for plants of various ages. The numbers 10-10-10-2 refer respectively to the percentages of nitrogen, phosphorus, potassium, and magnesium present in any given amount of the fertilizer. For example, 100 g of fertilizer contains 10 g each of nitrogen, phosphorus, and potassium and 2 g of magnesium.

Most plantings require nitrogen every year but seldom need annual applications of phosphorus, potassium, and magnesium. The actual nutrient requirements are best determined each year by analyzing leaves collected in late summer. Ammonium sulfate or urea are good sources of nitrogen. Use ammonium sulfate when the pH of the soil is above 5.0 and urea when the soil pH is below 5.0. Do not apply nitrogen in the form of nitrates.

TABLE 2. Rates of application of 10-10-10-2 fertilizer to highbush blueberries

Age of plantation, years <sup>1</sup>	Amount of fertilizer	
	Grams per plant	Kilograms per hectare <sup>2</sup>
Newly set	25	75
1	25	75
2	25	75
3	25	75
4	40	115
5	40	115
6	85	230
7	85	230
8	125	345
9	125	345
10 and older	170	455

<sup>1</sup>Number of years since plants were set in the field.  
<sup>2</sup>Based on a spacing of 3 m x 1.2 m or 2690 bushes per hectare.

### Cultivating

Because the highbush blueberry root system is shallow, cultivation should also be shallow and only performed when necessary to control weeds. Late growth prompted by excessive fertilization and late cultivation is often winter killed, so avoid these practices. If growth appears excessive, sow a cover crop such as oats to reduce the level of available nutrients.

### Controlling weeds with chemicals

Because available chemicals and methods are changing rapidly, consult an agricultural representative or research station specialist before deciding on a herbicide program.



## **Mulching**

Mulching with sawdust, straw, wood shavings, or leaves is probably not practical for the commercial grower, although it may be helpful to the home gardener. Young mulched plants can suffer more winter injury, however, than unmulched plants because the mulched plants do not harden off as quickly as the unmulched ones.

Mixing sawdust or wood shavings with the soil is also of questionable value. Decomposing sawdust and shavings make heavy demands on available nitrogen and can severely interfere with the nutrition of the blueberry. If you use a surface mulch of sawdust or shavings or incorporate them with the soil, be sure to supply additional nitrogen.

## **Irrigating**

An irrigation system is a better investment than are mulching materials because it can supply moisture when it is most needed. Irrigation can ensure maximum berry size and provide the growth that is necessary for the following year's crop. Blueberry plantings should generally receive 2.5 cm of water each week during the growing season.

## **Pruning**

The blueberry produces fruit only on the previous season's growth. The plant has a very definite tendency to overbear, so its growth must be controlled to maintain plant vigor, fruit size, and fruit maturity.

For the first 2 years do not prune a newly planted blueberry bush, but remove all blossoms. Cropping during these early years would retard plant growth and the first objective is to develop a sturdy upright bush.

In the 3rd year remove only the small spindly growth near the base of the plant.

During and after the 4th year remove dead and injured branches, fruiting branches close to the ground, spindly twigs on mature branches, and old stems or branches low in vigor.

Prune any time during the dormant season when most of the leaves have dropped to the ground and, if necessary, until the plants are in flower.

## **Propagating**

Highbush blueberries do not come true from seed, so they must be propagated from hardwood or softwood cuttings. Propagation is difficult for beginners and special facilities are required. Economically, you would be wise to buy plants from a reliable nursery.





FIGURE 2. Twelve-year-old Berkeley bushes. A single plant may yield over 5.5 kg.

## Harvesting

Highbush blueberries are borne in clusters of 5–10 berries. The berries in a cluster ripen in succession over a period of 4–5 weeks. In Nova Scotia the first berries of early varieties mature late in July.

The most common error in harvesting highbush blueberries is picking before the fruit is fully ripe. The berries may appear ripe, but if the stem ends are still reddish in color the berries are immature. Immature berries do not ripen completely on standing. Even after the berries have turned blue all over, they still take 3–7 days to develop the characteristic good flavor that makes customers come back for more. Because of premature harvesting, the highbush blueberry is considered by many to be inferior in quality to the lowbush blueberry.

Berries should be picked once a week by rolling (not squeezing) the berries between the forefinger and thumb. Mechanical harvesting equipment is used in some main production areas. Electrically powered hand-operated vibrators and over-the-row self-propelled machines are both popular.

For the fresh market, blueberries are usually packed in pint (0.3 kg) boxes. The boxes are heaped with berries of uniform size, covered with a cellophane sheet, and packed in 12-pint (3.4 kg) flats.

## Yields

No fruit is picked the first 2 years. In the 3rd year each bush may produce 0.14 kg of fruit. Yields increase after the 3rd year until the bush is 6–10 years old. A mature bush can produce more than 5.5 kg of fruit, but 2–2.5 kg is considered average. This yield is equivalent to 5000–6000 kg/ha.

## **Birds**

Unless it is protected, the entire crop of a small planting can be eaten by birds. For a small area, netting is the best protection. To protect large plantings, birds must be trapped and gas guns exploded periodically, preferably combined with actual shooting of the pests.

## **Insects**

Insects do not seriously affect highbush blueberry plants in Eastern Canada. This immunity may not continue if the number of large plantings increases considerably.

## **Diseases**

Canker is the worst disease of highbush blueberries in Eastern Canada. It first appears as small reddish discolorations on the stems. As these discolorations enlarge, the bark in the central area turns gray and then brown. Usually the canker completely girdles the stem in one season. Plants with girdled stems die, and during the summer their brown foliage is very obvious. Pruning the affected parts several inches below the cankered area provides some control. Varieties differ in their susceptibility. Jersey is very susceptible and is not recommended for planting.

Stunt and mosaic are two virus diseases that can be a problem. Stunt can be identified by very poor growth, and mosaic by the mottled leaf pattern. Affected plants should be destroyed.

A few other diseases such as mildew and mummy berry can also affect the plants, but they are not serious. Get assistance in the identification and control of blueberry diseases from your nearest agricultural office.

For fungicide controls consult your local agricultural authorities to learn the most recent approved procedures.

## **Pollination**

Recent studies have proved that cross-pollinated plants are more productive than those that are self-pollinated. New plantings should therefore contain more than one variety. A ratio of a row of one variety to two or three rows of a different variety is considered adequate for good cross-pollination.

## **Varieties**

Greatly improved varieties have recently been developed. Concord, Pioneer, Jersey, Earliblue, and Blueray are no longer recommended. For commercial plantings use Bluetta, Bluecrop, Berkeley, and Coville. For home gardeners wanting a large, sweet berry, Berkeley is the best. Recommended varieties are described below in order of their season of ripening.

**BLUETTA** — Bush moderately vigorous, compact. Fruit medium-sized, light blue, firm, with good flavor. Outstanding features are early ripening and consistent production.

**BLUECROP** — Bush upright and vigorous, with a tendency to over-bear. Young bushes slightly winter tender. Fruit clusters large and medium loose. Berries large, very light blue, firm, subacid, and of good quality.

**BERKELEY** — Bush very vigorous, open, spreading, and very productive. Fruit clusters large and medium loose. Berries largest of all, light blue, medium firm, crisp, with mild sweet flavor, and of good quality.

**COVILLE** — Bush vigorous, upright productive, and winter tender. Fruit clusters large and medium loose. Berries very large, very late, and of good quality.

CONVERSION FACTORS		
Metric units	Approximate conversion factors	Results in:
<b>LINEAR</b>		
millimetre (mm)	x 0.04	inch
centimetre (cm)	x 0.39	inch
metre (m)	x 3.28	feet
kilometre (km)	x 0.62	mile
<b>AREA</b>		
square centimetre (cm <sup>2</sup> )	x 0.15	square inch
square metre (m <sup>2</sup> )	x 1.2	square yard
square kilometre (km <sup>2</sup> )	x 0.39	square mile
hectare (ha)	x 2.5	acres
<b>VOLUME</b>		
cubic centimetre (cm <sup>3</sup> )	x 0.06	cubic inch
cubic metre (m <sup>3</sup> )	x 35.31	cubic feet
	x 1.31	cubic yard
<b>CAPACITY</b>		
litre (L)	x 0.035	cubic feet
hectolitre (hL)	x 22	gallons
	x 2.5	bushels
<b>WEIGHT</b>		
gram (g)	x 0.04	oz avdp
kilogram (kg)	x 2.2	lb avdp
tonne (t)	x 1.1	short ton
<b>AGRICULTURAL</b>		
litres per hectare (L/ha)	x 0.089	gallons per acre
	x 0.357	quarts per acre
	x 0.71	pints per acre
millilitres per hectare (mL/ha)	x 0.014	fl. oz per acre
tonnes per hectare (t/ha)	x 0.45	tons per acre
kilograms per hectare (kg/ha)	x 0.89	lb per acre
grams per hectare (g/ha)	x 0.014	oz avdp per acre
plants per hectare (plants/ha)	x 0.405	plants per acre



